

INSECTS OF SAMOA
AND OTHER SAMOAN TERRESTRIAL
ARTHROPODA

NEMATOCERA

By F. W. EDWARDS, M.A.

[Reprinted from "Insects of Samoa," Part VI., Fascicle 2—Diptera, published by the Trustees of the
British Museum, 23rd June, 1928]

INSECTS OF SAMOA

PART VI. FASC. 2

NEMATOCERA*

BY F. W. EDWARDS, M.A.

(With 20 Text-figures.)

UNTIL 1926 the Nematoceros Diptera of Samoa were practically unknown, the only published records relating to six species of Culicidae and five of Tipulidae.† The material obtained by the Buxton and Hopkins expedition, together with that in the possession of the Bishop Museum, Honolulu, raises the total number of species of Nematocera to 100. Although this total is certainly far short of the number which exist on the islands, it is sufficiently large to enable us to draw provisional conclusions as to the nature and origin of the fauna. These conclusions may require modification when the Nematocera of adjoining regions are better known; unfortunately, except in the case of mosquitoes, this suborder has been very little collected as yet in Polynesia, Fiji, Melanesia, or Papua.

The general evidence provided by the Nematocera is entirely in accord with that which has been deduced from the study of other groups; that is to say that the Samoan fauna is purely of Austro-Malayan origin, and shows no connection whatever with New Zealand or South America, nor even with Australia, except in so far as the tropical Austro-Malayan fauna extends into the northern part of that continent. There are considerable resemblances, but almost equally

* This report embraces all groups of Nematocera except the gall-midges of the subfamily Cecidomyiinae, which are discussed by H. F. Barnes in a separate paper in this fascicle. The four Cecidomyiinae, however, are included in the total of 100 species mentioned in the introduction to this paper.

† I am informed by Dr. W. Horn that no Samoan Nematocera are contained in the collection of the German Entomological Institute; and Prof. G. Enderlein writes that the only species represented in the Berlin Zoological Museum is *Aedes kochi* Dön. var. *samoana* Grünb.

noteworthy differences between the Nematoceros fauna of Samoa and of Fiji; from which we may probably conclude that a large part of the fauna has reached Samoa directly and not through Fiji.

The following summary indicates the genera hitherto found in Samoa, with the number of species of each arranged according to their known distribution:

Family, genus or subgenus.	Undetermined.	Samoa only.	Samoa and Fiji only.	Wider external distribution.	Total Samoan species.
MYCETOPHILIDAE.					
<i>Macrocera</i>	—	1	—	—	1
<i>Platyura</i>	—	1	—	—	1
<i>Manota</i>	—	1	—	—	1
<i>Zygophronia</i>	—	1	—	—	1
<i>Exechia</i>	—	1	—	—	1
<i>Delopsis</i>	—	2	—	—	2
<i>Sciara</i>	2	—	—	1	3
<i>Phorodonta</i>	—	1	—	1	2
<i>Plastosciara</i>	—	—	1	1	2
<i>Scythropochroa</i>	—	—	1	—	1
<i>Dodecasciara</i>	—	—	1	—	1
CECIDOMYIIDAE.					
<i>Anarete</i>	—	1	—	—	1
<i>Lestremia</i>	—	1	—	—	1
<i>Lestodiplosis</i>	1	—	—	—	1
<i>Allobremia</i>	—	1	—	—	1
<i>Licbeliola</i>	—	1	—	—	1
<i>Phaenepidosis</i>	—	1	—	—	1
SCATOPSIDAE.					
<i>Swammerdamella</i>	—	—	1	—	1
ANISOPODIDAE.					
<i>Mesochria</i>	—	1	—	—	1
CULICIDAE.					
<i>Aedes</i> (<i>Stegomyia</i>)	—	—	—	2	2
„ (<i>Finlaya</i>)	—	—	—	1	1
„ (<i>Aëdimorphus</i>)	—	—	—	1	1
<i>Culex</i>	—	1	—	2	3
CERATOPOGONIDAE.					
<i>Forcipomyia</i>	—	3	—	2	5
<i>Lasiohelea</i>	—	1	—	—	1
<i>Atrichopogon</i>	—	2	—	1	3
<i>Dasyhelea</i>	1	1	—	1	3
<i>Culicoides</i>	—	—	1	—	1
<i>Ceratopogon</i>	—	1	—	—	1
<i>Stilobezzia</i>	—	1	—	—	1
<i>Bezzia</i>	—	1	—	—	1

Family, genus or subgenus.	Undetermined.	Samoa only.	Samoa and Fiji only.	Wider external distribution.	Total Samoan species.
CHIRONOMIDAE.					
<i>Ablabesmyia</i>	1	1	—	1	3
<i>Thalassomyia</i>	—	1	—	—	1
<i>Clunio</i>	—	1	—	—	1
<i>Orthocladius</i>	—	1	—	—	1
<i>Tanytarsus</i>	—	3	—	—	3
<i>Pontomyia</i>	—	1	—	—	1
<i>Chiromomus</i>	2	2	—	—	4
PSYCHODIDAE.					
<i>Brunettia</i>	—	—	1	—	1
<i>Lepidopsychoda</i>	—	—	1	—	1
<i>Psychoda</i>	—	2	—	2	4
TIPULIDAE.					
<i>Dicranomyia</i> (s. str.)	—	2	1	—	3
,, (<i>Idioglochina</i>)	—	1	—	—	1
,, (<i>Alexandriaria</i>)	—	1	—	—	1
<i>Thrypticomysia</i>	—	—	1	1	2
<i>Pseudoglochina</i>	—	1	—	—	1
<i>Libnotes</i>	—	1	1	4	6
<i>Rhipidia</i>	—	1	—	—	1
<i>Geranomyia</i>	—	1	—	—	1
<i>Helius</i>	—	1	—	—	1
<i>Toxorhina</i>	—	1	—	—	1
<i>Styringomyia</i>	—	—	—	1	1
<i>Empeda</i>	—	1	—	—	1
<i>Gonomyia</i> (<i>Lipophleps</i>)	—	4	—	—	4
<i>Trentepohlia</i> (<i>Mongoma</i>)	—	8	1	—	9
Total	7	60	11	22	100

It is probable that the proportion of endemic species indicated is somewhat too high, because some of these regarded provisionally as endemic will no doubt be found to occur in Fiji or elsewhere. But it is very remarkable that the proportions indicated are exactly the same as those found by Meyrick (*Ins. Samoa*, Pt. III, Fasc. 2, p. 65, May, 1927) to exist among the Microlepidoptera: 6 endemic species to 1 Polynesian and 2 apodemic. Of the 51 genera represented, 39 contain endemic species, a similar proportion to that in the Microlepidoptera; the average number of species per genus in both groups is less than two. The great majority of the genera are of universal distribution, most

of the remainder being palaeotropical. Only four of the genera appear to be endemic to the Pacific, *Zygophronia* and *Dodecasciara* among the Mycetophilidae, *Allobremia* among the Cecidomyiidae and *Pontomyia* among the Chironomidae. Of these three *Dodecasciara* has been found in Fiji and may perhaps prove to be an introduction; the other three have at present been found only in Samoa. All are monotypic.

Only one genus (*Trentepohlia*) has undergone an extensive local development; in most other cases where several species of a genus occur (e.g. *Chironomus*, *Libnotes*) they are unrelated, and evidently reached Samoa independently.

Hopkins (*Ins. Samoa*, Pt. III, Fasc. 1, p. 5, April, 1927) has suggested in his account of the butterflies that the fauna of Western Samoa (Upolu and Savaii) may have come in part directly from New Guinea, and that of American Samoa (Tutuila and the Manua group) mainly by way of Fiji and Tonga. The collections of Nematocera afford little evidence for or against this suggestion, largely because of the scantiness of the material from the American islands. Only three species in the collection have been obtained on Tutuila and not on Upolu or Savaii; one of these (*Plastosciara flavibasis*) has also been found in Fiji. Seven others (apart from apodemic species) have been found on Tutuila as well as on the other islands, and two of these (*Dodecasciara debilis* and *Trentepohlia brevicellula*) are also known from Fiji.

There is no indication in the material studied of any tendency to the formation of distinct island races within the Samoan group. A large number of species have been obtained from more than one island, but so far as observed the variation which occurs is individual only and not local.

As regards local distribution, two conclusions seem to be indicated from a study of the available data: (1) most of the apodemic species are found chiefly at the low levels, although several (e.g. *Plastosciara pacifica*, *Aedes variegatus*, *Atrichopogon jacobsoni*) have penetrated into the mountains; (2) many more species are found in the higher forests than in the coastal belt.

By far the greater number of species belong to genera whose members are known to breed in decaying or fermenting organic matter. This applies to all the Sciarinae, some at least of the Cecidomyiidae, the single Scatopsid and Anisopodid, all the Ceratopogonidae except *Stilobezzia* and *Bezzia*, all the Psychodidae, and also *Dicranomyia*, *Libnotes*, *Rhipidia*, *Styringomyia* and probably others among the Tipulidae. Such species would readily find lodgment

in small collections of humus in ships or canoes, especially those carrying cattle, and this has no doubt been the means of transport of most of the apodemic species. It is known that before the coming of the white man Samoa was definitely a centre of dispersion for Polynesians, who used big canoes holding up to 100 men and carrying roots and food for long voyages. There are some indications that certain insects spread during these early voyages may have been differentiated since into definite local races (*e.g.* *Aedes variegatus* var. *pseudocutellaris* and *A. kochi* var. *samoana*). In prehuman times humus-feeding species may very well have made use of driftwood.

Wind has also with little doubt been an important factor in the colonisation of the islands. Buxton (*Researches in Polynesia and Melanesia*, p. 50, 1927) has pointed out that in the upper air there is a constant strong wind blowing from the west or north, although the surface air currents are more variable and mainly in the opposite direction. It will be noted that all the Samoan Nematocera are either small or very lightly built; the more heavily-built forms, such as the Bibionidae and the larger Tipulidae, are absent.

The distribution and affinities of the Samoan Nematocera are further discussed below under the separate families.

Except where otherwise stated, the types of new species are in the British Museum (Natural History); a few unique specimens from the Bishop Museum collection have been returned to that institution.

MYCETOPHILIDAE

No species of this family have been recorded from Samoa, but sixteen are represented in the collection before me. This is not a large number, but probably represents a fair proportion of those existing in the islands, because at my request Mr. Buxton paid special attention to this family. The fungus-gnats have been well collected in New Zealand, where they form a dominant element of the fauna throughout the country, and it was thought possible that there might be some northward extension of this fauna into the Pacific. The collections obtained show that if there is any such northward extension it has certainly not reached Samoa. Excluding the Sciarinae, which are humus feeders and therefore easily spread, only seven species were found, most of which show affinities with Malayan forms.

The predominance of the subfamily Sciarinae (56 per cent. of the total number of species collected) is in accordance with findings in other parts of the tropics, but affords a striking contrast with the New Zealand fauna, where only 7.5 per cent. of the total number of species belong to the Sciarinae. All the other subfamilies appear to attain their full representation only in temperate regions.

Eleven of the species are described as new, two of them being placed in new genera. In both cases the characters on which the new genera are founded are striking but of no fundamental importance, and indicate a recent origin.

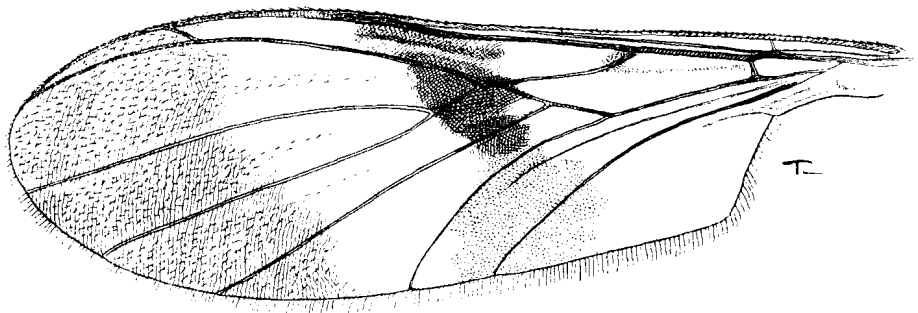
In addition to the species recorded below, the following are known from Fiji: *Leia* (*Rhymoleia*) *fijiensis* Edw.; *Delopsis greenwoodi* Edw.; *Sciara distigma* Edw.

MACROCERINAE.

1. *Macrocera nitens*, sp. n.

Text-fig. 1.

Head blackish, front very broad. *Antennae* ochreous at the base, shading to dark brown; about four times as long as body in ♂, three times in ♀; first



TEXT-FIG. 1.—*Macrocera nitens*, sp. n. Wing.

segment much enlarged, especially in ♂. *Thorax* shining black, shoulders more or less yellowish. *Abdomen* with segments 1-3 (♂) or 1 and 2 (♀) yellow, 2 with a narrow blackish basal band, the rest entirely shining black. *Legs* ochreous. Wings hyaline with the apex broadly dark brown, as far back as R_4 ; a second dark brown band, rather irregular in outline, across middle of wing, just touching tip of basal cell and base of median fork, rather broader towards costa. A small

dark patch at base of *Rs*. R_1 swollen apically, its tip pale. Costa reaching nearly half-way from R_5 to M_1 . R_4 short, nearly vertical. Anal lobe large and right-angled in ♂, smaller and rather obtuse in ♀. Macrotrichia numerous in apical third of wing, practically none towards base. Halteres ochreous. Wing-length, 4 mm. ; antennae, ♂ 13, ♀ 10 mm.

Tutuila : Pago Pago, type ♂ and ♀, 14.xii.1925. Upolu : Malololelei, 2,000 ft., 1 ♀, xii.1925 ; Sliding Rock, 1 ♂, 16.ix.1923 (Swezey and Wilder).

A very distinct species which need only be compared with *M. egregia* de Meij. (= *bifasciata* Edw.) of Sumatra and Borneo, which is very similar in colouring but has bare wings.

CEROPLATINAE.

2. *Platyura hopkinsi*, sp. n.

♀. *Head* dark brown above, face ochreous. Antennae with the scape ochreous, flagellum dark brown, segments hardly longer than broad. Palpi brownish, rather long. Middle ocellus small, slightly in front of the others. *Thorax* brown, with very little grey dusting ; scutum with three darker brown stripes, which are almost fused ; pronotum and hypopleurite yellow. No spiracular bristles ; postnotum and pleurotergites bare ; postnotum flattened above, rather small and not much produced. Fine setae of mesonotum evenly distributed. *Abdomen* dark brown, posterior margins of tergites ochreous. *Legs* with coxae and femora ochreous, tarsi darkened. First segment of front tarsus about as long as the tibia. Fine tibial setae rather irregularly arranged on basal half of tibia, but forming regular rows on the apical third or half. Outer spur of posterior tibiae scarcely half as long as the inner. *Wings* nearly hyaline, indistinctly darkened on apical half. *Sc* ending above base of *Rs*. R_4 rather short, situate somewhat before the middle point between tips of R_1 and R_5 . Costa produced more than a third of the way from R_5 to M_1 . *An* reaching margin. Halteres ochreous, base of knob darkened. Wing-length 4 mm.

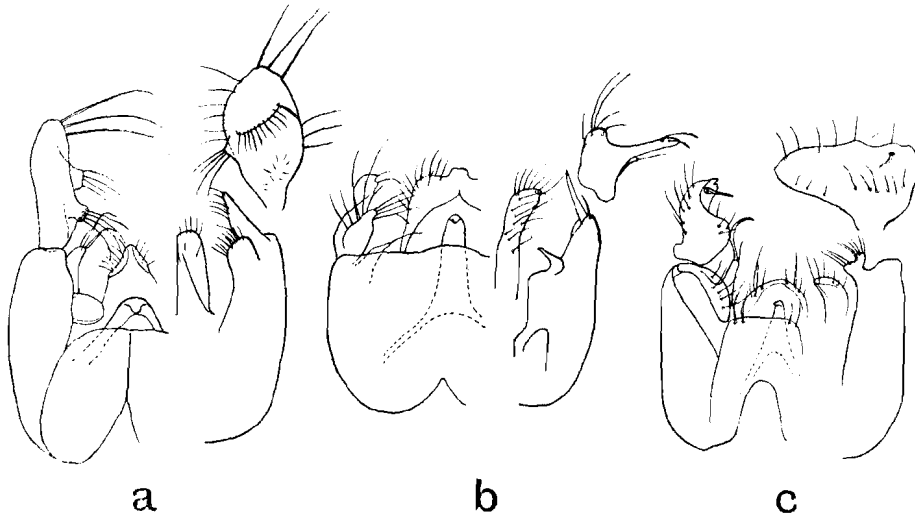
Upolu : Apia, 1 ♀, 3.viii.1925.

MANOTINAE.

3. *Manota pacifica*, sp. n.

Text-fig. 2, c.

♂. Very similar to *M. flavipes* End. (Seychelles) and *M. orientalis* White (Ceylon), agreeing with both in having the orbital bristles yellow, legs yellow with scarcely any darkening at bases of posterior femora, and wings entirely clear; differing from each in having the flagellar segments (except the last) scarcely longer than broad, with shorter pubescence which is only about half as long as the diameter of the segments. The hypopygia of the three species show considerable differences, as is indicated in the accompanying figures.



TEXT-FIG. 2.—Hypopygium of *Manota*, spp.: (a) *M. orientalis* Senior-White; (b) *M. flavipes* End.; (c) *M. pacifica*, sp. n. Left half from beneath; right half from above, with clasper detached and seen in side view.

Savaii: Safune, rain forest above 2,000 ft., type ♂ (unique—in the Bishop Museum), 9.v.1924 (Bryan).

One other species of *Manota* has been recorded from the Australasian region, viz. *M. maorica* Edw. (New Zealand). This differs from *M. pacifica* and the two other species above mentioned in having the orbital bristles black; posterior femora blackish at base; and wings smoky on apical half. In other details all species of this genus are extremely similar.

MYCETOPHILINAE.

Zygophronia, gen. n.

Characters as in *Phronia*, but vein *Cu* simple; the genus therefore bears the same relation to *Phronia* as *Zygomya* does to *Mycetophila*.

4. *Zygophronia pusilla*, sp. n.

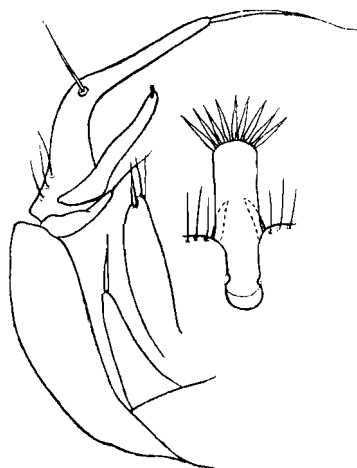
♀. *Head* dark brown, face and area round antennae, also the scape, yellowish; flagellum and palpi blackish, flagellar segments about as long as broad. *Thorax* ochreous, bristles black; dorsocentral bristles distinct; scutellum with four marginal bristles; four anepisternal bristles. Mesonotum with a pair of sublateral brown lines, and another pair converging posteriorly along the rows of dorsocentral bristles. *Abdomen* brown, segments 1-5 lighter at base laterally. *Legs* ochreous, including the whole of the coxae; tips of hind femora and tibiae rather indistinctly darkened. *Wings* faintly brownish tinged, unmarked. Costa produced slightly beyond tip of *R*₅, which is almost straight; median fork rather widely open, its stem a little longer than *r-m*. Halteres with ochreous stem and brown knob. Wing-length 1.7 mm.

Upolu: Malololelei, 2,000 ft., 1 ♀, 30.xi. 1924.

5. *Exechia lutacea*, sp. n.

Text-fig. 3.

♂. *Head* dark greyish, with fine pale hairs. Antennae with the first three or four segments ochreous, the rest dark; flagellar segments not longer than broad. Palpi yellow. No median ocellus. *Thorax* entirely ochreous, sides of scutum with slight grey reflections when seen from above. Two propleural bristles. Two long terminal scutellar bristles, and two other shorter ones in the middle. Discal bristles of scutum short and indistinct. *Abdomen* dark brown; first segment, base of second, lateral margins of tergites and hypopygium ochreous. Hypopygium constructed as in Text-fig. 3. *Legs* ochreous, tarsi darker; no



TEXT-FIG. 3.—Hypopygium of *Exechia lutacea*, sp. n. Left half from above, also middle part of ninth sternite.

Abdomen dark brown; first segment, base of second, lateral margins of tergites and hypopygium ochreous. Hypopygium constructed as in Text-fig. 3. *Legs* ochreous, tarsi darker; no

dark mark beneath base of hind femora. Front tibiae on the outer side with a regular close-set row of 15-20 very short blunt bristles, the row occupying outer half of tibia or rather more. Middle tibiae with a similar external row of bristles, but the 12-15 bristles rather less regular, rather more widely spaced, and pointed. Hind tibiae with about 12 external, 6 dorsal and 6 short internal bristles. *Wings* slightly brownish. *Rs* almost straight, its base very short, not a quarter as long as *r-m*; base of median fork about half as long as *r-m*. Cubital fork very short, both branches equally distinct. *An* absent. Halteres ochreous. Wing-length 2.2 mm.

Upolu: Malololelei, 2,000 ft., type ♂, 25.xi.1924. Savaii: Salailua, 2 ♂, 23.v.1924 (Bryan).

This species belongs to a group of closely allied forms, which has a wide distribution in the tropics of the old world; I have seen a number of representatives from various parts of the Oriental region and also from Africa, Australia, and New Zealand.

6. *Delopsis buxtoni*, sp. n.

♂♀. *Head* ochreous. First few antennal segments ochreous, rest brownish. Palpi ochreous. *Thorax* mainly shining black above, but a broad ochreous collar on front of scutum, and the depressions on each side of scutellum also ochreous. Prothoracic sclerites ochreous, rest of pleurae dark brown. Five propleural bristles. Anepisternal suture distinct. Pleurotergite and pterotergite very small, together barely a quarter as large as the anepisternite. *Abdomen* black dorsally, sides of tergites broadly ochreous, this colour extending upwards at base of segment 3 and more so at bases of 4 and 5, but not so far as to form a complete transverse band. Genitalia small and hidden. *Legs* ochreous, tarsi and tibial bristles and spurs dark. Mid-tibial bristles: 5 dorsal, 2 (rarely 3) subdorsal, 3 external, 3 rather long ventral, 0 internal. Hind-tibial bristles in three rows, middle row with 2-3 bristles. *Wings* brownish, costa extending slightly beyond tip of *Rs*. Halteres ochreous. Wing-length 3.5 mm.

Upolu: Malololelei, 2,000 ft., 5 ♂, 1 ♀, including type ♂, 10.iii.1924, 25.xi.1924 and xii.1925. Upolu: Vaea, 1,100 ft., 1 ♂, 25.iv.1924 (Bryan). Savaii: Salailua, two specimens, 19.v.1924 (Bryan). Sexes not readily distinguishable.

Delopsis buxtoni much resembles *D. greenwoodi* Edw. (Fiji), *D. collaris* (End.) (Seychelles) and several other species, but differs in the chaetotaxy of the legs.

Two specimens from New Hebrides (Espiritu Santo I., Hog Harbour) are very similar to *D. buxtoni* as described above, but are smaller, and the middle tibiae have only one subdorsal bristle.

The genus *Delopsis* is widely distributed, but is most extensively developed in the tropics of the old world. The peculiar case-bearing larvae have been reported as having been found on the leaves of bamboo and other plants; presumably they feed upon moulds and not upon the leaf itself, but observations on this point are desirable.

7. *Delopsis scutellaris*, sp. n.

Sex (?). *Head* brownish-ochreous. First five or six antennal segments ochreous, the rest dark brown. Palpi ochreous. *Thorax* shining black above, scutum without pale collar. Scutellum wholly yellow. Prothoracic sclerites brownish-ochreous, rest of pleurae black. Three propleural bristles, only one pteropleural. Anepisternite very large, as in *D. buxtoni*, but the suture dividing it from the sternopleurite much less distinct. (*Abdomen* missing in case of type.) *Legs* ochreous, bristles, spurs and tarsi dark. Mid-tibial bristles: 5 dorsal, 0 subdorsal, 3 external, 2 very long and 1 short ventral, 0 internal. (Hind legs missing in case of type.) *Wings* yellowish-tinged; costa more distinctly produced than in *D. buxtoni*. Halteres ochreous. Wing-length 2.3 mm.

Upolu: Malololelei, 2,000 ft., one broken specimen, xii.1925.

Although the type is unfortunately imperfect, the species should be recognised easily by the colour of the thorax and the chaetotaxy of the middle tibiae.

SCIARINAE.

8. *Sciara radicum* Brunetti.

Fauna Brit. Ind., Dipt. Nemat., p. 139, 1913.

Tutuila: Pago Pago, 1 ♂, 1 ♀, 2.xii.1924, 14.xii.1925. Upolu: Apia, 2 ♀, bred from rotten grass, iv.1925. Savaii: Safune, 1 ♂, 4.v.1924 (Bryan). Fiji: Vanua Levu, Savusavu, 2 ♀, 22.vii.1923 (C. L. Edwards). Recorded by Brunetti from Calcutta, the larvae attacking lily bulbs in gardens.

I have compared the Samoan series with Indian specimens received from Brunetti, and can find no constant differential characters. All the Indian specimens have vein M_1 indistinct at the base; most, but not all, of those from Samoa have it distinct throughout. Brunetti has somewhat understated